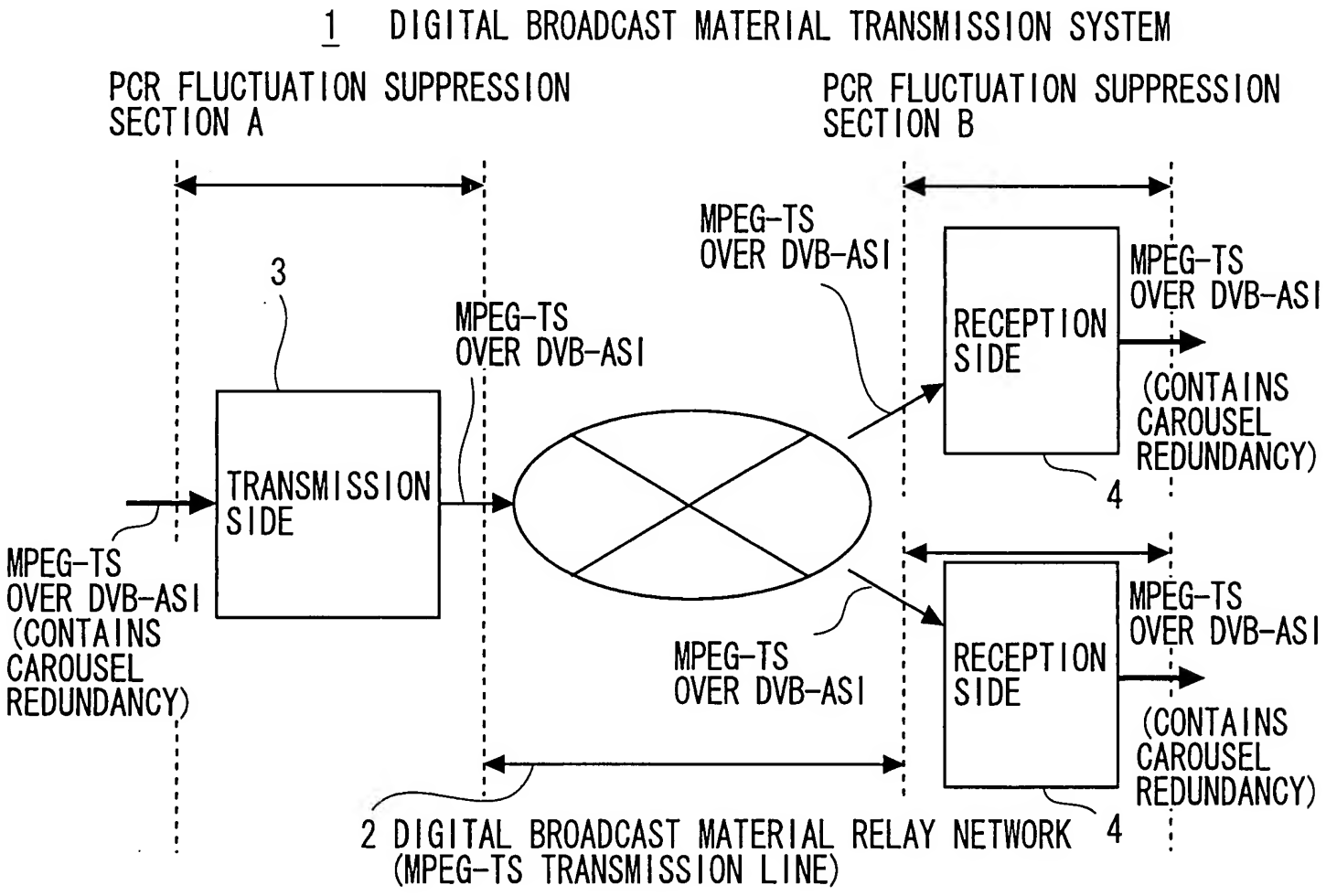
FIG. 1



3, 4 :DIGITAL BROADCAST MATERIAL TRANSMITTER

FIG. 2

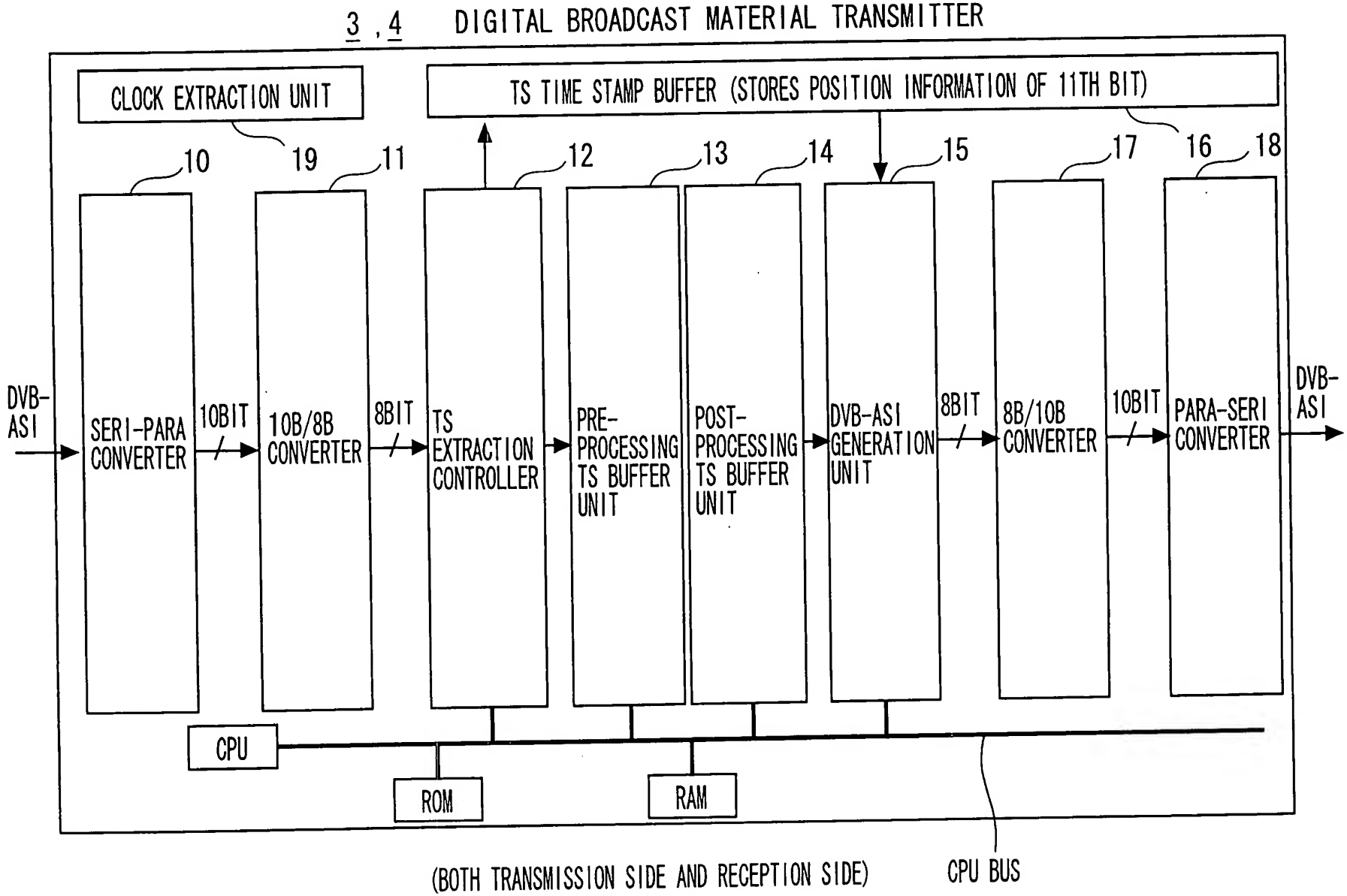

3 , 4 DIGITAL BROADCAST MATERIAL TRANSMITTER
CLOCK EXTRACTION UNIT
TS TIME STAMP BUFFER (STORES POSITION INFORMATION OF 11TH BIT)
10
19
11
12
13
14
15
17
16
18
DVB-ASI
SERI-PARA CONVERTER
10BIT
10B/8B CONVERTER
8BIT
TS EXTRACTION CONTROLLER
PRE-PROCESSING TS BUFFER UNIT
POST-PROCESSING TS BUFFER UNIT
DVB-ASI GENERATION UNIT
8BIT
8B/10B CONVERTER
10BIT
PARA-SERI CONVERTER
DVB-ASI
CPU
ROM
RAM
(BOTH TRANSMISSION SIDE AND RECEPTION SIDE)
CPU BUS

FIG. 3

SPI:SYNCHRONOUS PARALLEL INTERFACE
SSI:SYNCHRONOUS SERIAL INTERFACE SYNCHRONOUS
ASI:ASYNCHRONOUS SERIAL INTERFACE

FIG. 4

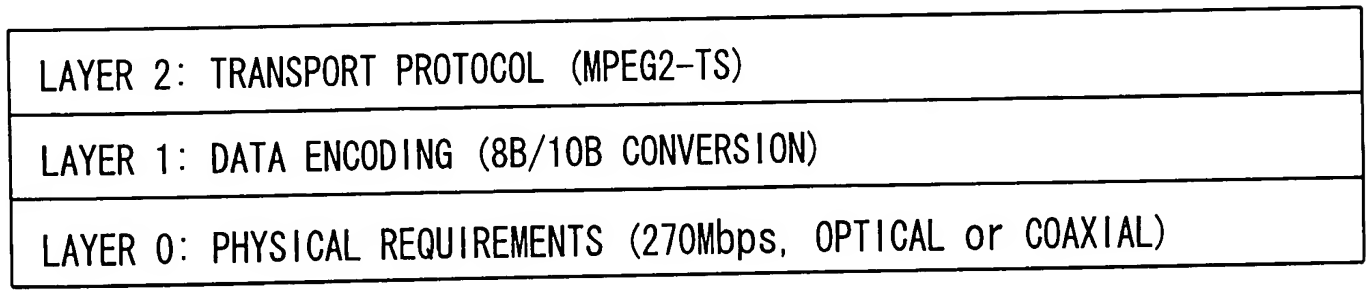

LAYER 2: TRANSPORT PROTOCOL (MPEG2-TS)
LAYER 1: DATA ENCODING (8B/10B CONVERSION)
LAYER 0: PHYSICAL REQUIREMENTS (270Mbps, OPTICAL or COAXIAL)

FIG. 5

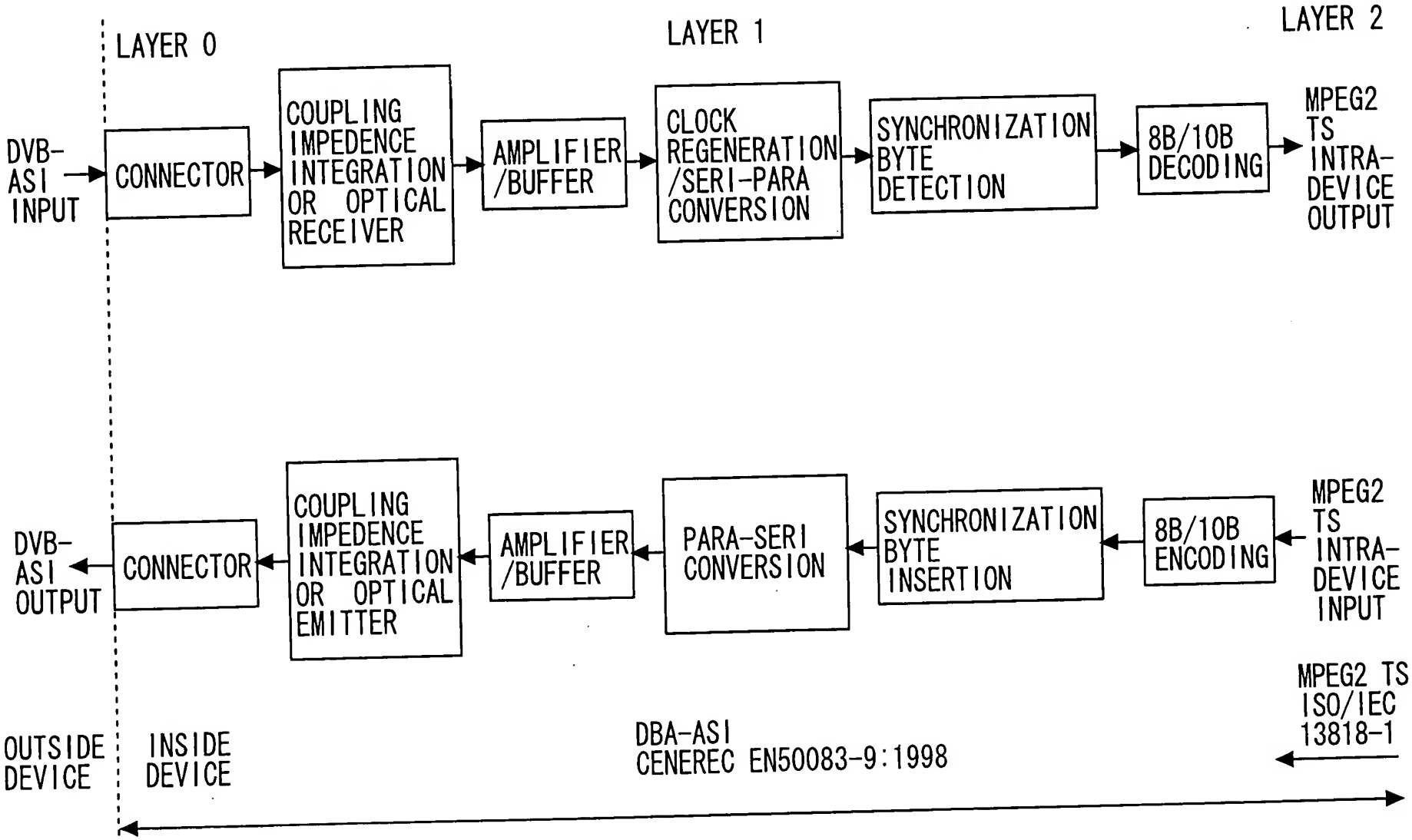
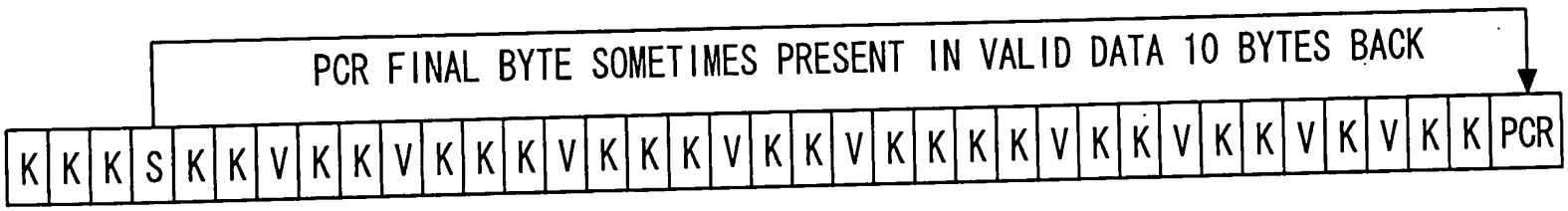
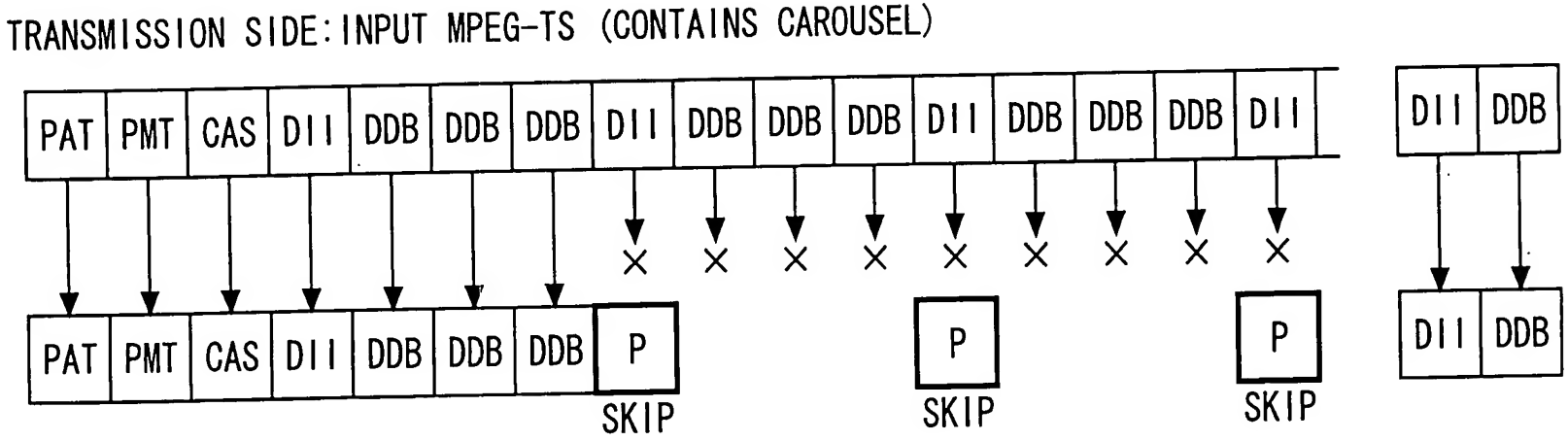

LAYER 0
LAYER 1
LAYER 2
DVB-ASI INPUT
CONNECTOR
COUPLING IMPEDENCE INTEGRATION OR OPTICAL RECEIVER
AMPLIFIER /BUFFER
CLOCK REGENERATION /SERI-PARA CONVERSION
SYNCHRONIZATION BYTE DETECTION
8B/10B DECODING
MPEG2 TS INTRA-DEVICE OUTPUT
DVB-ASI OUTPUT
CONNECTOR
COUPLING IMPEDENCE INTEGRATION OR OPTICAL EMITTER
AMPLIFIER /BUFFER
PARA-SERI CONVERSION
SYNCHRONIZATION BYTE INSERTION
8B/10B ENCODING
MPEG2 TS INTRA-DEVICE INPUT
MPEG2 TS ISO/IEC 13818-1
OUTSIDE DEVICE
INSIDE DEVICE
DBA-ASI CENEREC EN50083-9:1998

FIG. 6



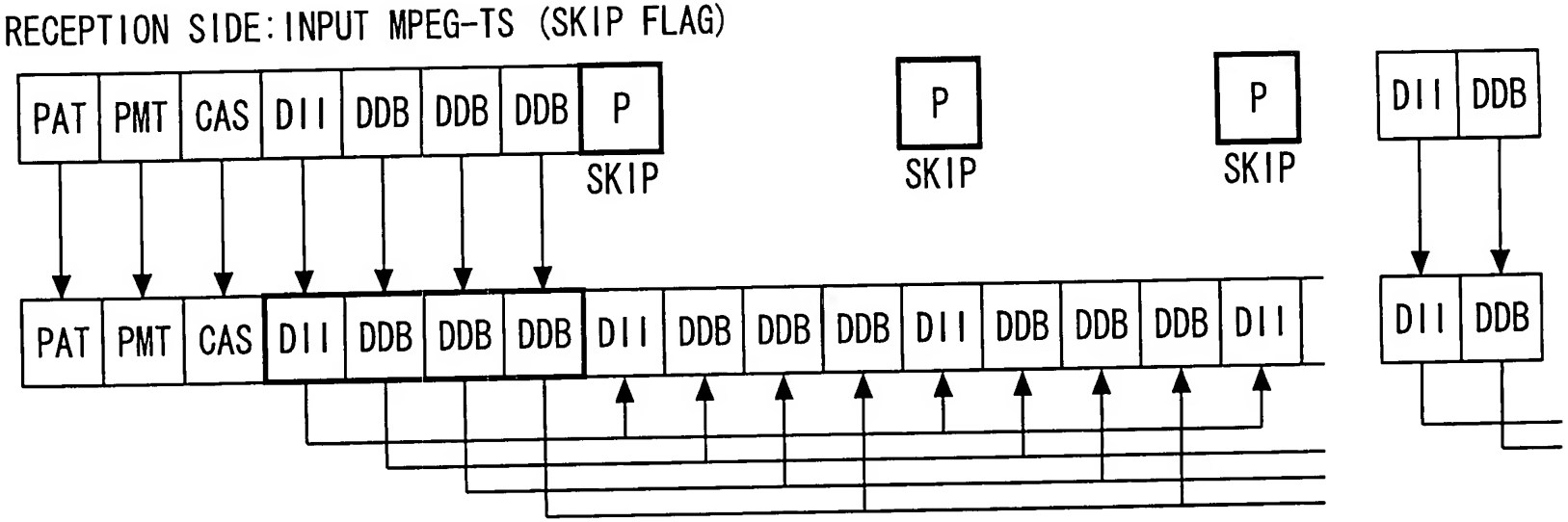
K :K28.5 AS DETERMINED BY DVB-ASI
S :SYNC. IN TRANSPORT PACKET HEADER
V :VALID DATA IN TRANSPORT PACKET
PCR:10TH BYTE VALID DATA COUNTING FROM S, WHERE THERE COULD BE ADAPTATION FIELD PCR
FINAL BYTE OF TRANSPORT PACKET HEADER

FIG. 7



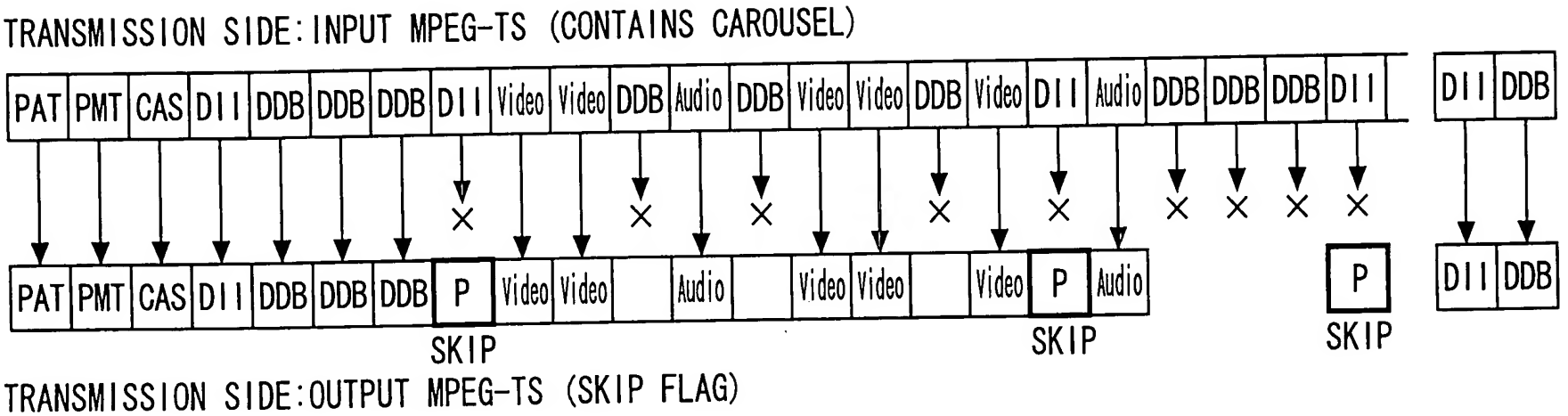
PAT:PROGRAM ASSOCIATION SECTION
PMT:TS PROGRAM MAP SECTION
CAS:CONDITIONAL ACCESS SECTION
P: PRIVATE SECTION
DII:DSM-CC SECTION (CONTAINS DownloadInfoIndication)
DDB:DSM-CC SECTION (CONTAINS DownloadDataBlock)

FIG. 8



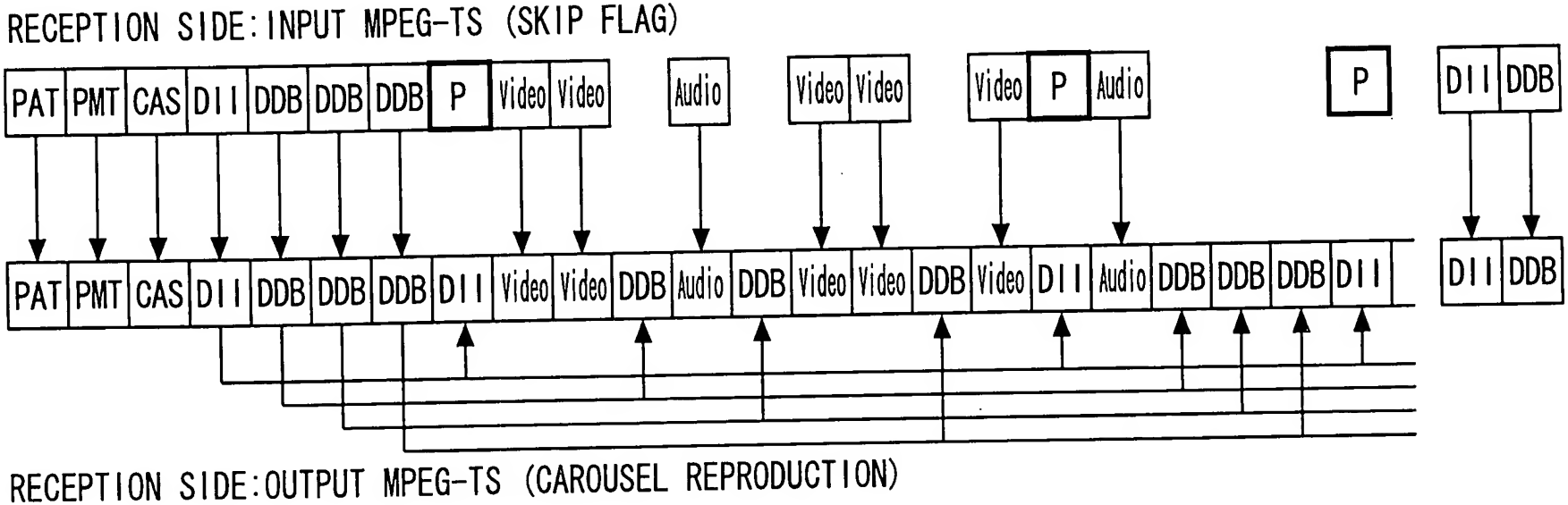
PAT:PROGRAM ASSOCIATION SECTION
PMT:TS PROGRAM MAP SECTION
CAS:CONDITIONAL ACCESS SECTION
P: PRIVATE SECTION
DII:DSM-CC SECTION (CONTAINS DownloadInfoIndication)
DDB:DSM-CC SECTION (CONTAINS DownloadDataBlock)

FIG. 9



PAT:PROGRAM ASSOCIATION SECTION
PMT:TS PROGRAM MAP SECTION
CAS:CONDITIONAL ACCESS SECTION
DII:DSM-CC SECTION (CONTAINS DownloadInfoIndication)
DDB:DSM-CC SECTION (CONTAINS DownloadDataBlock)
Video:PES Packet (Video)
Audio:PES Packet (Audio)

FIG. 10



PAT:PROGRAM ASSOCIATION SECTION
PMT:TS PROGRAM MAP SECTION
CAS:CONDITIONAL ACCESS SECTION
P: PRIVATE SECTION
DII:DSM-CC SECTION (CONTAINS DownloadInfoIndication)
DDB:DSM-CC SECTION (CONTAINS DownloadDataBlock)
Video:PES Packet (Video)
Audio:PES Packet (Audio)

FIG. 11

[CAROUSEL SKIP DESCRIPTORS] ( ){		
dsscriptor_tag	8	uimsbf
dsscriptor_length	8	uimsbf
CurrentSkipCount	8	uimsbf
TotalSkipCount	32	uimsbf
for(i=0;i<N;i++){		
stuffing_byte	8	bslbf
}		
}		

FIG. 12

```
[STUFFING DESCRIPTORS] (  ){                                    
     dsscriptor_tag                                    8     uimsbf
     dsscriptor_length                                 8     uimsbf
     for(i=0;i<N;i++ ){
             stuffing_byte                             8     bslbf
     }
}
```

FIG. 13

praivate_section( ){		
table_id	8	uimsbf
section_syntax_indicator	1	bslbf
praivate_indicator	1	bslbf
reserved	2	bslbf
private_section_length	12	uimsbf
[CAROUSEL SKIP DESCRIPTORS] ( )		
}		

FIG. 14

praivate_section( ){		
table_id	8	uimsbf
section_syntax_indicator	1	bslbf
praivate_indicator	1	bslbf
reserved	2	bslbf
private_section_length	12	uimsbf
[SUTFFING DESCRIPTORS] ( )		
}		

FIG. 15A

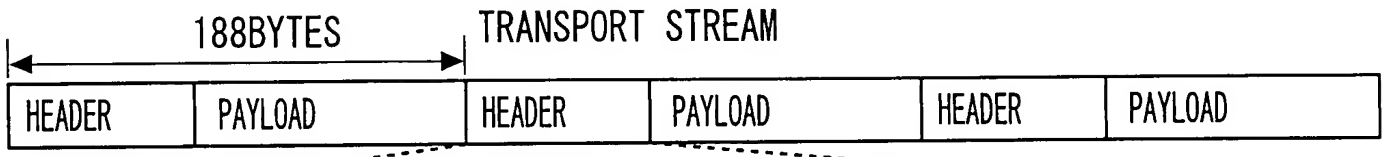


FIG. 15B

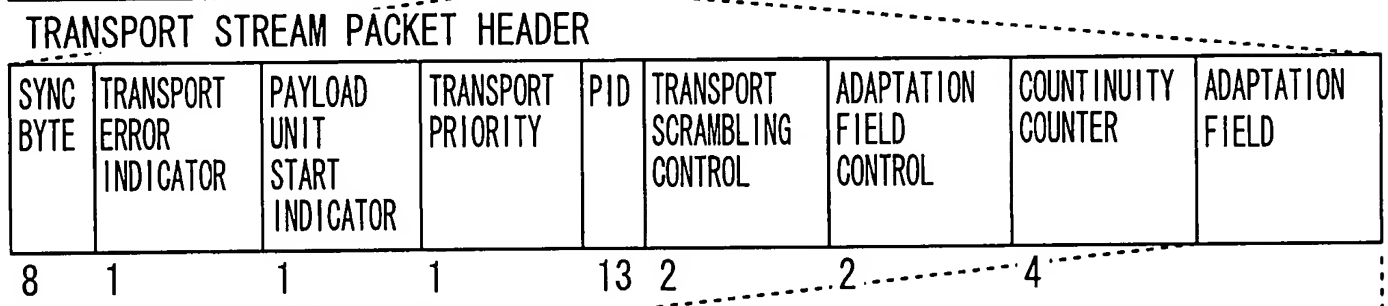


FIG. 15C

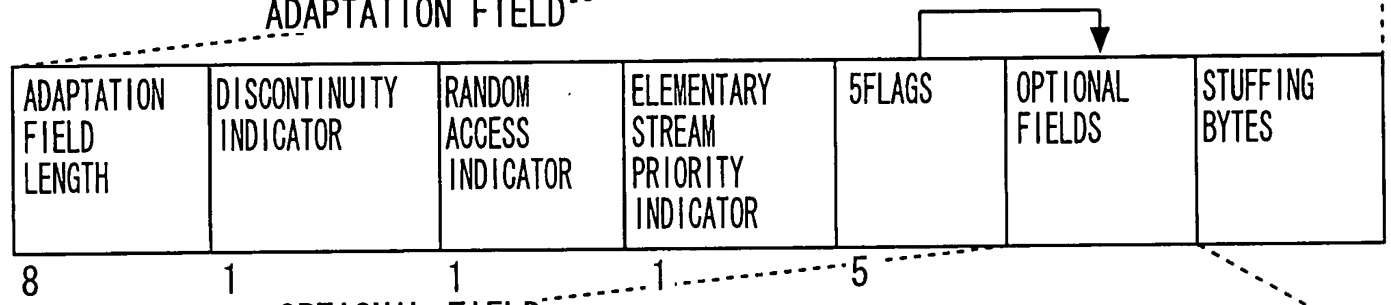


FIG. 15D

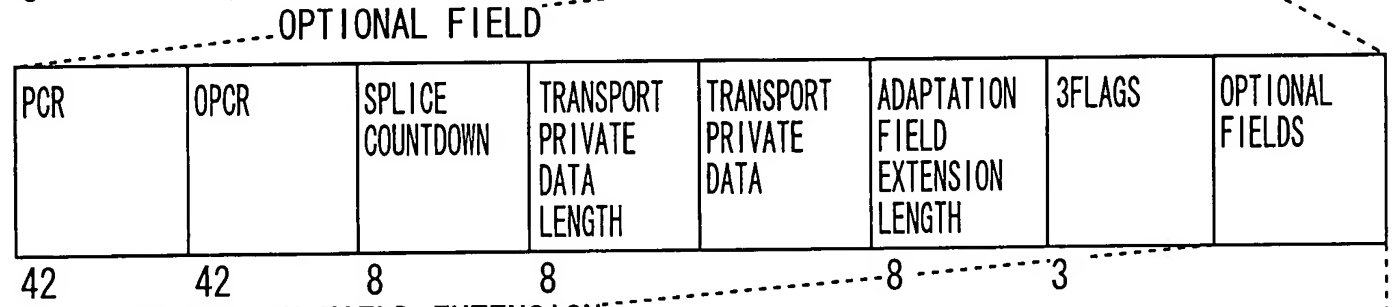


FIG. 15E

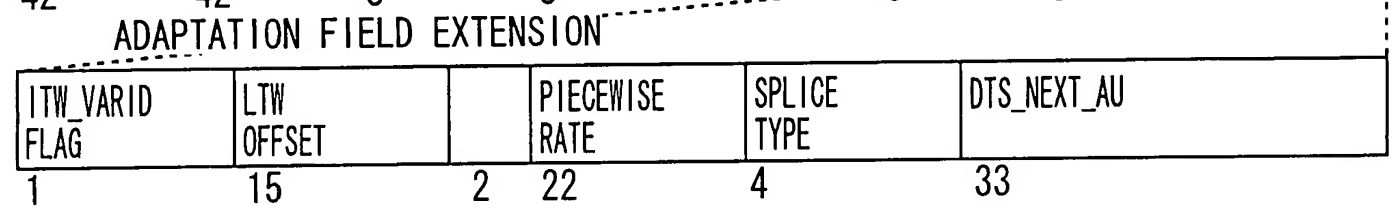


FIG. 16

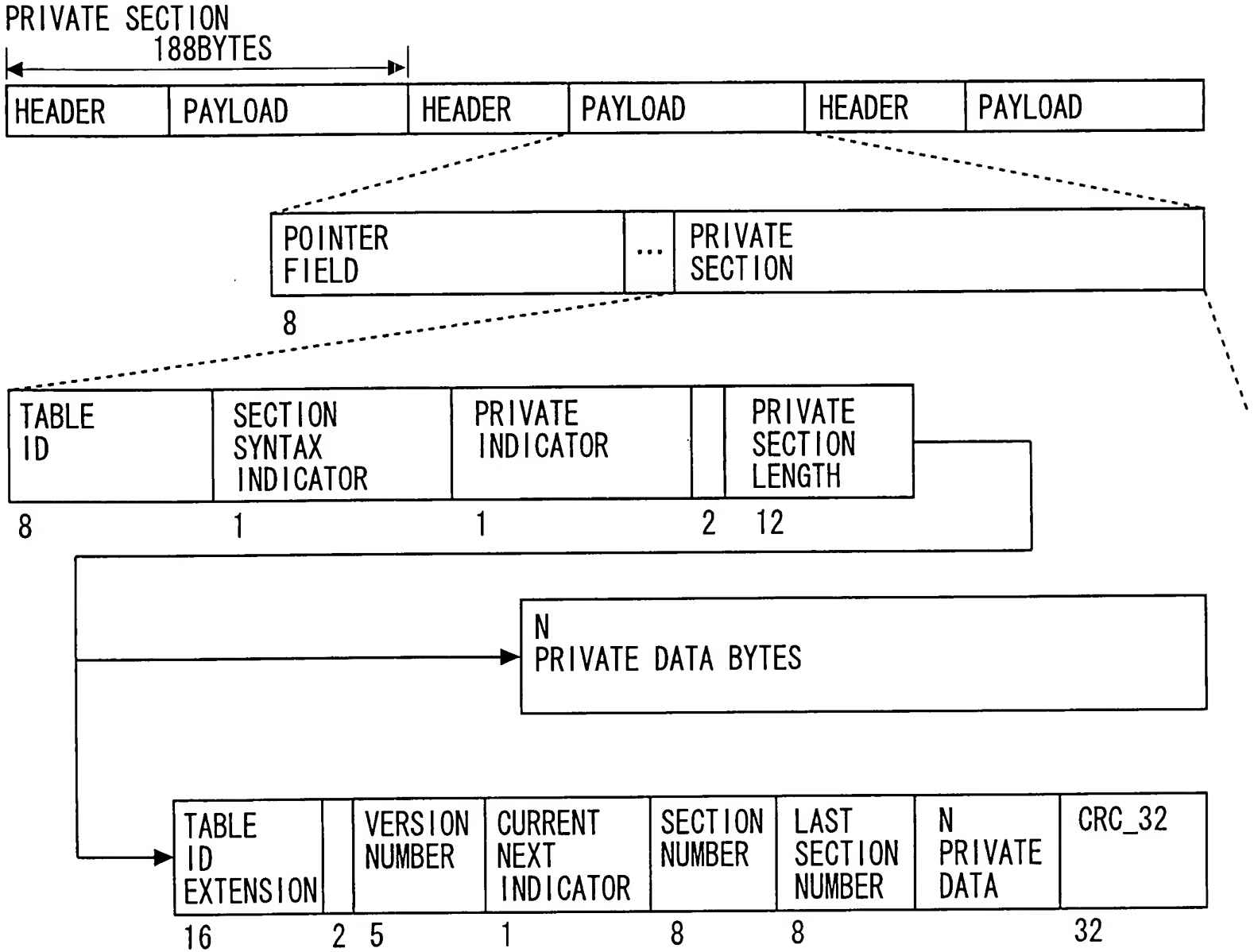

PRIVATE SECTION
188BYTES
HEADER
PAYLOAD
HEADER
PAYLOAD
HEADER
PAYLOAD
POINTER FIELD
...
PRIVATE SECTION
8
TABLE ID
SECTION SYNTAX INDICATOR
PRIVATE INDICATOR
PRIVATE SECTION LENGTH
8
1
1
2
12
N
PRIVATE DATA BYTES
TABLE ID EXTENSION
VERSION NUMBER
CURRENT NEXT INDICATOR
SECTION NUMBER
LAST SECTION NUMBER
N PRIVATE DATA
CRC_32
16
2
5
1
8
8
32

FIG. 17

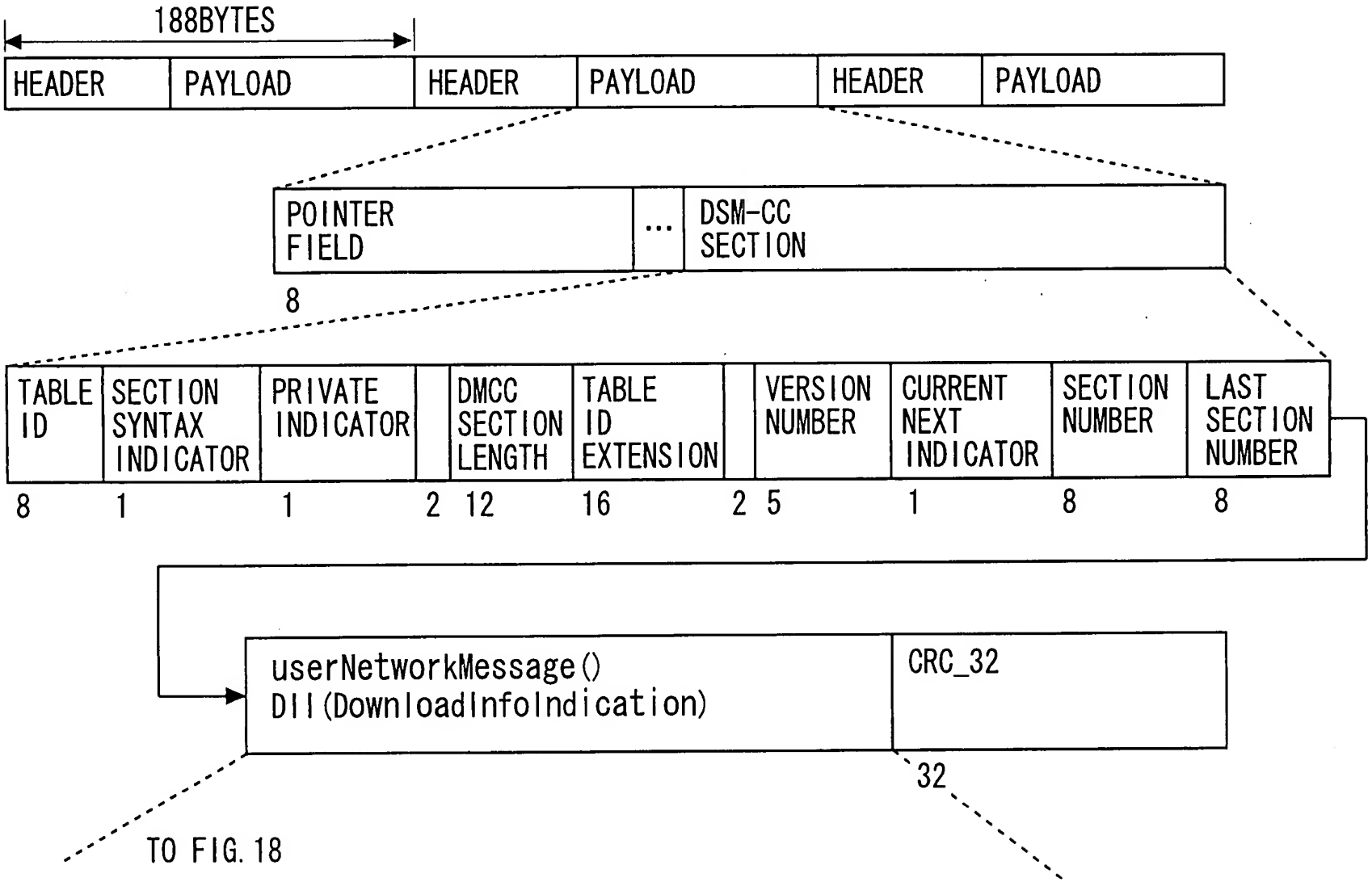

188BYTES
HEADER
PAYLOAD
HEADER
PAYLOAD
HEADER
PAYLOAD
POINTER FIELD
...
DSM-CC SECTION
8
TABLE ID
SECTION SYNTAX INDICATOR
PRIVATE INDICATOR
DMCC SECTION LENGTH
TABLE ID EXTENSION
VERSION NUMBER
CURRENT NEXT INDICATOR
SECTION NUMBER
LAST SECTION NUMBER
8
1
1
2
12
16
2
5
1
8
8
userNetworkMessage()
DII(DownloadInfoIndication)
CRC_32
32
TO FIG. 18

FIG. 18

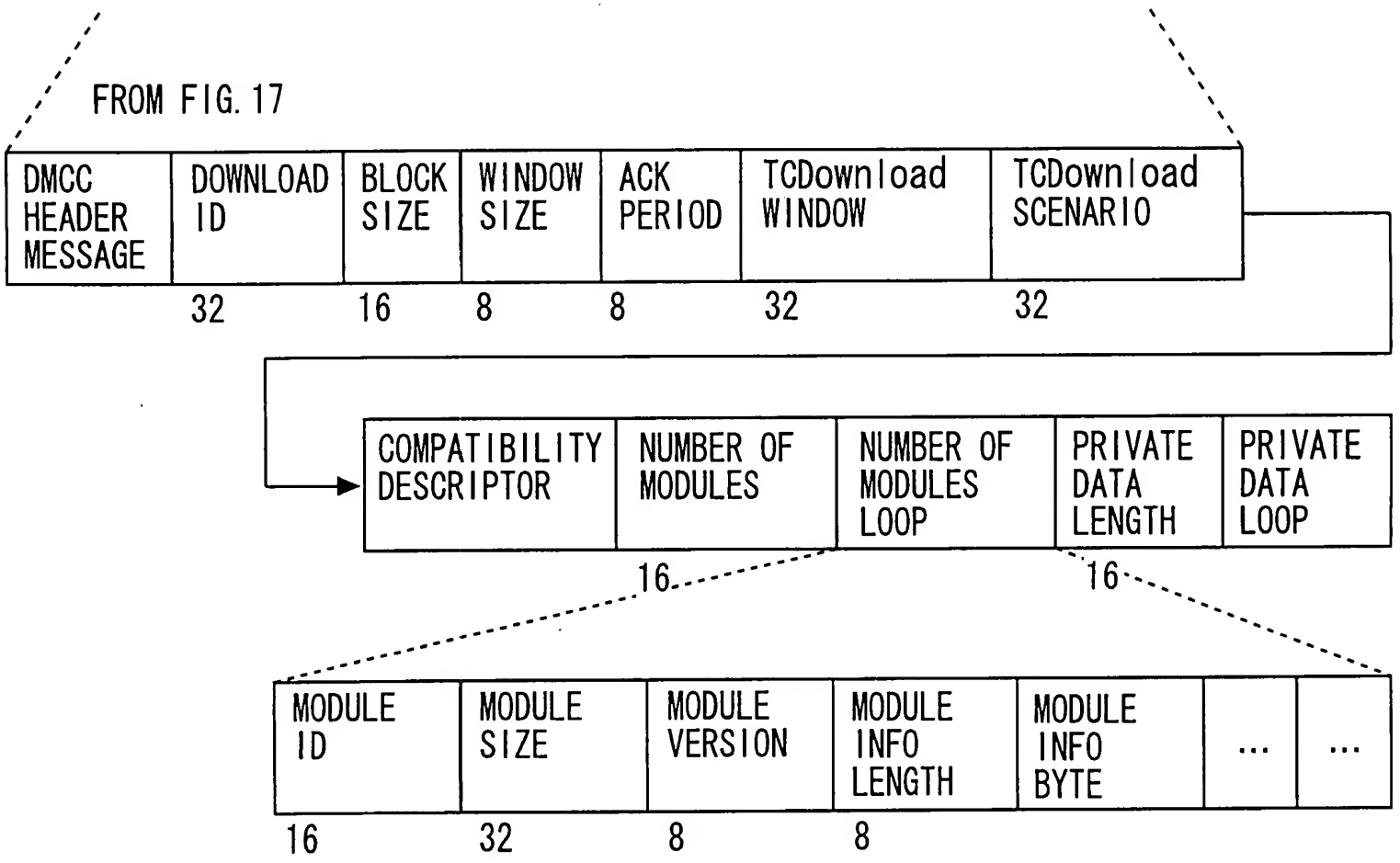

FROM FIG. 17
DMCC HEADER MESSAGE
DOWNLOAD ID
BLOCK SIZE
WINDOW SIZE
ACK PERIOD
TCDownload WINDOW
TCDownload SCENARIO
32
16
8
8
32
32
COMPATIBILITY DESCRIPTOR
NUMBER OF MODULES
NUMBER OF MODULES LOOP
PRIVATE DATA LENGTH
PRIVATE DATA LOOP
16
16
MODULE ID
MODULE SIZE
MODULE VERSION
MODULE INFO LENGTH
MODULE INFO BYTE
...
...
16
32
8
8

FIG. 19

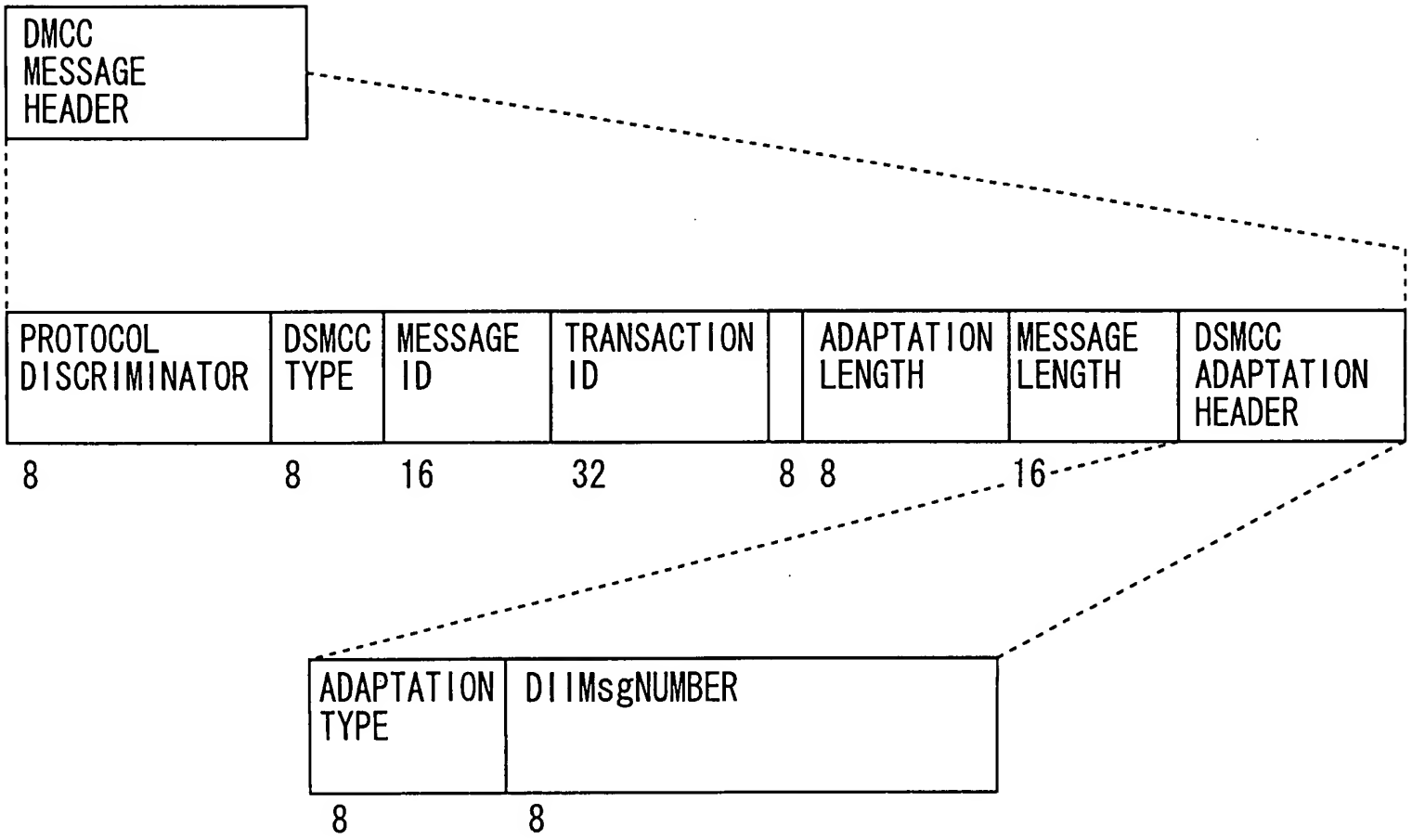

DMCC MESSAGE HEADER
PROTOCOL DISCRIMINATOR
DSMCC TYPE
MESSAGE ID
TRANSACTION ID
ADAPTATION LENGTH
MESSAGE LENGTH
DSMCC ADAPTATION HEADER
8
8
16
32
8
8
16
ADAPTATION TYPE
DIIMsgNUMBER
8
8

FIG. 20

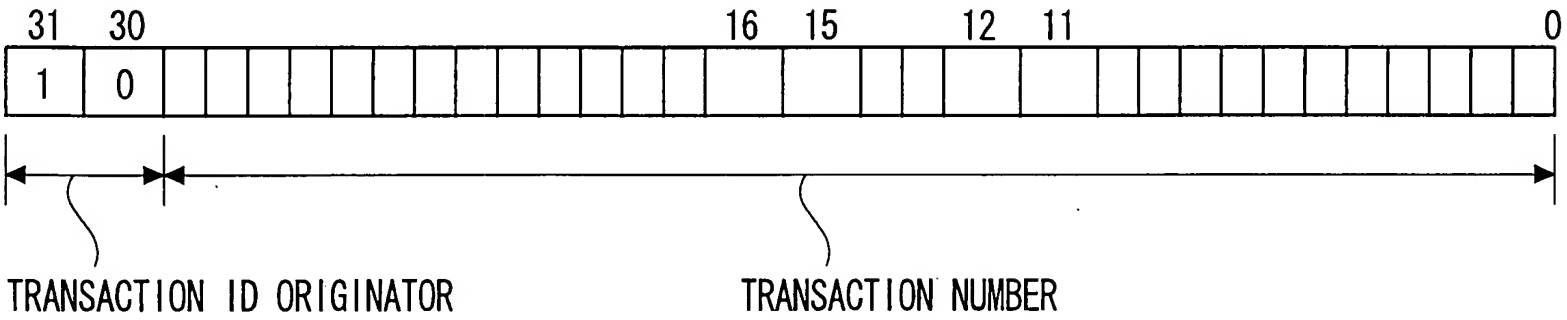

31
30
16
15
12
11
0
1
0
TRANSACTION ID ORIGINATOR
TRANSACTION NUMBER

FIG. 21

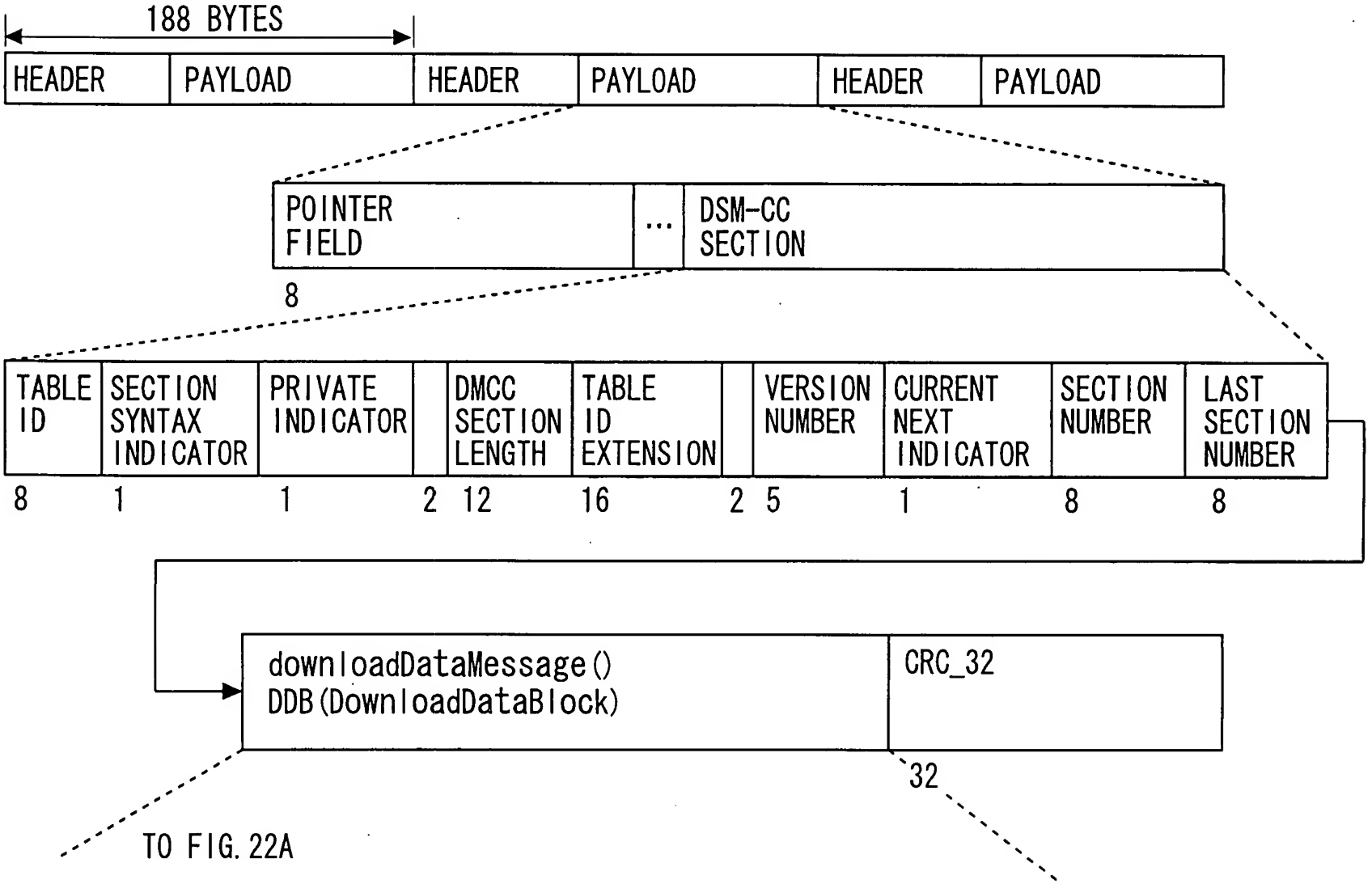
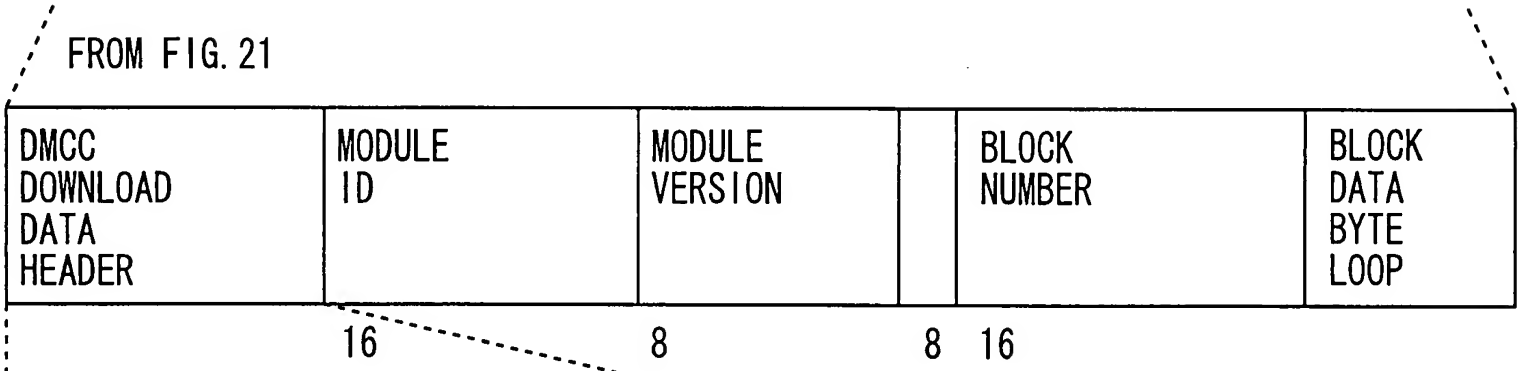
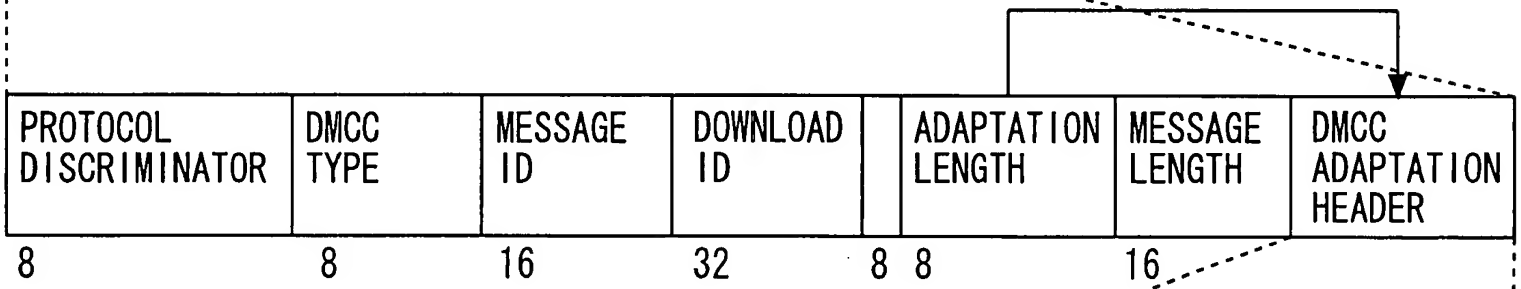

188 BYTES
HEADER
PAYLOAD
HEADER
PAYLOAD
HEADER
PAYLOAD
POINTER FIELD
...
DSM-CC SECTION
8
TABLE ID
SECTION SYNTAX INDICATOR
PRIVATE INDICATOR
DMCC SECTION LENGTH
TABLE ID EXTENSION
VERSION NUMBER
CURRENT NEXT INDICATOR
SECTION NUMBER
LAST SECTION NUMBER
8
1
1
2
12
16
2
5
1
8
8
downloadDataMessage()
DDB(DownloadDataBlock)
CRC_32
32
TO FIG. 22A

FIG. 22A



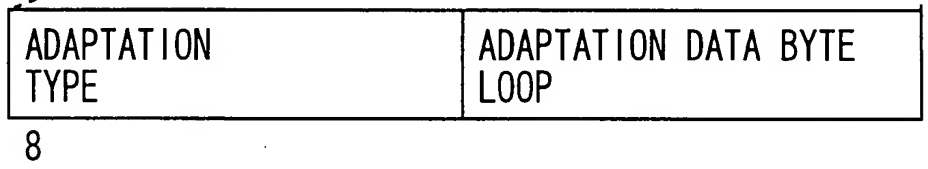
DATA STRUCTURE OF DownloadDataBlock

FIG. 22B



DATA STRUCTURE OF dsmccdownloadDataHeader

FIG. 22C



DATA STRUCTURE OF dsmccAdaptationHeader

FIG. 23A

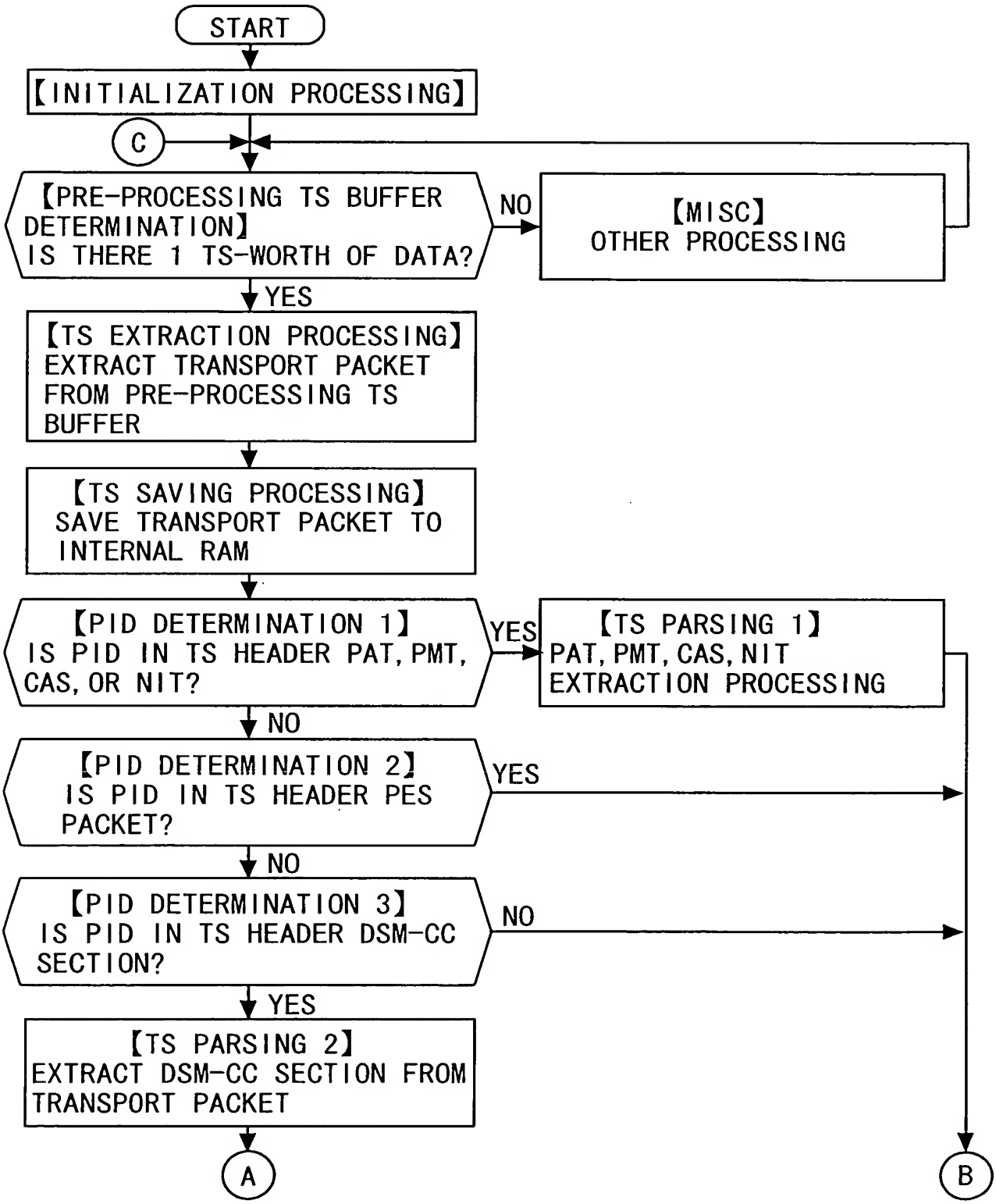

START
【INITIALIZATION PROCESSING】
C
【PRE-PROCESSING TS BUFFER DETERMINATION】
IS THERE 1 TS-WORTH OF DATA?
NO
【MISC】
OTHER PROCESSING
YES
【TS EXTRACTION PROCESSING】
EXTRACT TRANSPORT PACKET FROM PRE-PROCESSING TS BUFFER
【TS SAVING PROCESSING】
SAVE TRANSPORT PACKET TO INTERNAL RAM
【PID DETERMINATION 1】
IS PID IN TS HEADER PAT, PMT, CAS, OR NIT?
YES
【TS PARSING 1】
PAT, PMT, CAS, NIT EXTRACTION PROCESSING
NO
【PID DETERMINATION 2】
IS PID IN TS HEADER PES PACKET?
YES
NO
【PID DETERMINATION 3】
IS PID IN TS HEADER DSM-CC SECTION?
NO
YES
【TS PARSING 2】
EXTRACT DSM-CC SECTION FROM TRANSPORT PACKET
A
B

FIG. 23B

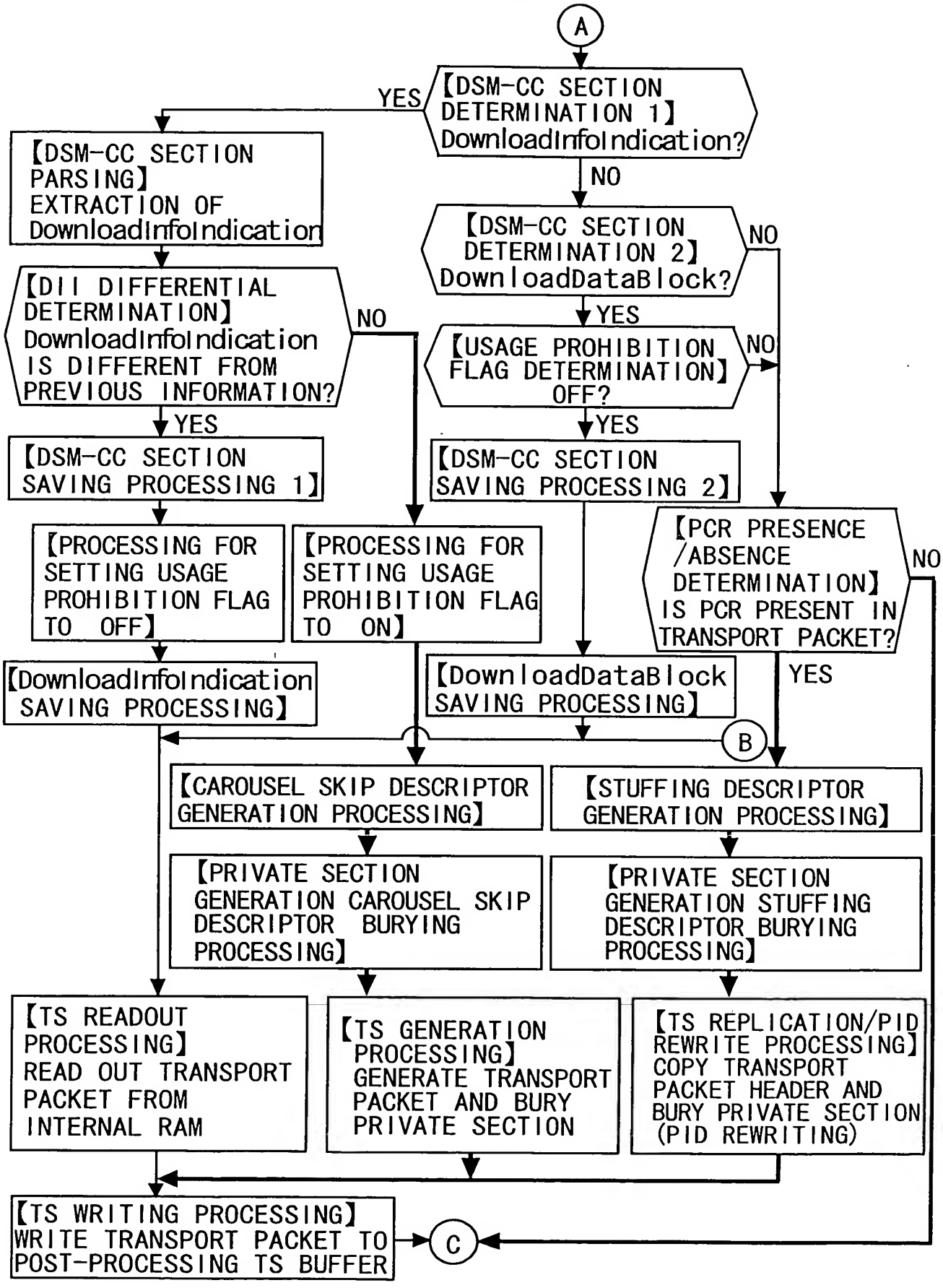

A
【DSM-CC SECTION DETERMINATION 1】 DownloadInfoIndication?
YES
NO
【DSM-CC SECTION PARSING】 EXTRACTION OF DownloadInfoIndication
【DII DIFFERENTIAL DETERMINATION】 DownloadInfoIndication IS DIFFERENT FROM PREVIOUS INFORMATION?
NO
YES
【DSM-CC SECTION SAVING PROCESSING 1】
【DSM-CC SECTION DETERMINATION 2】 DownloadDataBlock?
NO
YES
【USAGE PROHIBITION FLAG DETERMINATION】 OFF?
NO
YES
【DSM-CC SECTION SAVING PROCESSING 2】
【PROCESSING FOR SETTING USAGE PROHIBITION FLAG TO OFF】
【PROCESSING FOR SETTING USAGE PROHIBITION FLAG TO ON】
【PCR PRESENCE /ABSENCE DETERMINATION】 IS PCR PRESENT IN TRANSPORT PACKET?
NO
YES
【DownloadInfoIndication SAVING PROCESSING】
【DownloadDataBlock SAVING PROCESSING】
B
【CAROUSEL SKIP DESCRIPTOR GENERATION PROCESSING】
【STUFFING DESCRIPTOR GENERATION PROCESSING】
【PRIVATE SECTION GENERATION CAROUSEL SKIP DESCRIPTOR BURYING PROCESSING】
【PRIVATE SECTION GENERATION STUFFING DESCRIPTOR BURYING PROCESSING】
【TS READOUT PROCESSING】 READ OUT TRANSPORT PACKET FROM INTERNAL RAM
【TS GENERATION PROCESSING】 GENERATE TRANSPORT PACKET AND BURY PRIVATE SECTION
【TS REPLICATION/PID REWRITE PROCESSING】 COPY TRANSPORT PACKET HEADER AND BURY PRIVATE SECTION (PID REWRITING)
【TS WRITING PROCESSING】 WRITE TRANSPORT PACKET TO POST-PROCESSING TS BUFFER
C

FIG. 24A

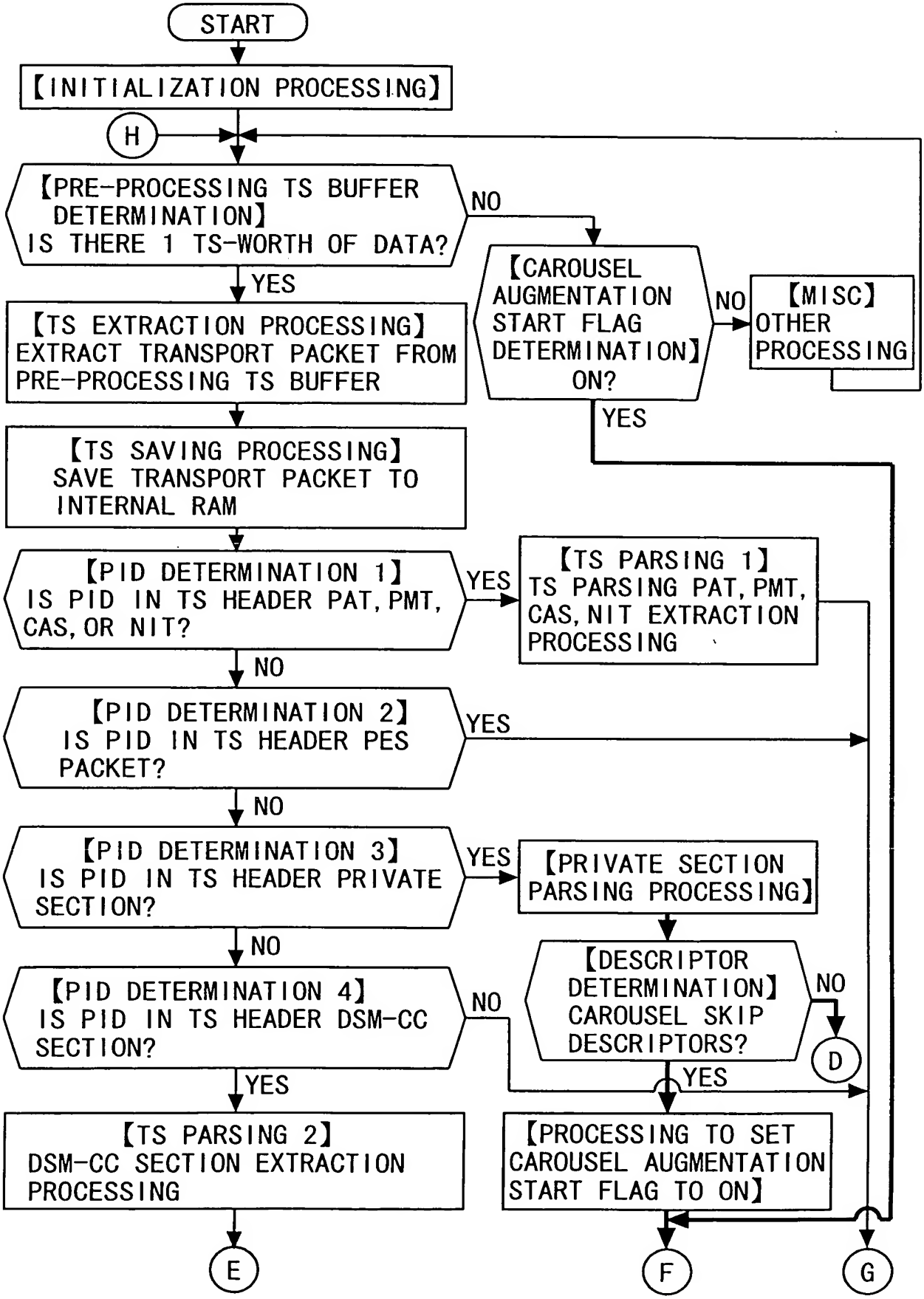

START
【INITIALIZATION PROCESSING】
H
【PRE-PROCESSING TS BUFFER DETERMINATION】 IS THERE 1 TS-WORTH OF DATA?
NO
YES
【CAROUSEL AUGMENTATION START FLAG DETERMINATION】 ON?
NO
【MISC】 OTHER PROCESSING
YES
【TS EXTRACTION PROCESSING】 EXTRACT TRANSPORT PACKET FROM PRE-PROCESSING TS BUFFER
【TS SAVING PROCESSING】 SAVE TRANSPORT PACKET TO INTERNAL RAM
【PID DETERMINATION 1】 IS PID IN TS HEADER PAT, PMT, CAS, OR NIT?
YES
【TS PARSING 1】 TS PARSING PAT, PMT, CAS, NIT EXTRACTION PROCESSING
NO
【PID DETERMINATION 2】 IS PID IN TS HEADER PES PACKET?
YES
NO
【PID DETERMINATION 3】 IS PID IN TS HEADER PRIVATE SECTION?
YES
【PRIVATE SECTION PARSING PROCESSING】
NO
【PID DETERMINATION 4】 IS PID IN TS HEADER DSM-CC SECTION?
NO
【DESCRIPTOR DETERMINATION】 CAROUSEL SKIP DESCRIPTORS?
NO
D
YES
YES
【TS PARSING 2】 DSM-CC SECTION EXTRACTION PROCESSING
【PROCESSING TO SET CAROUSEL AUGMENTATION START FLAG TO ON】
E
F
G

FIG. 24B

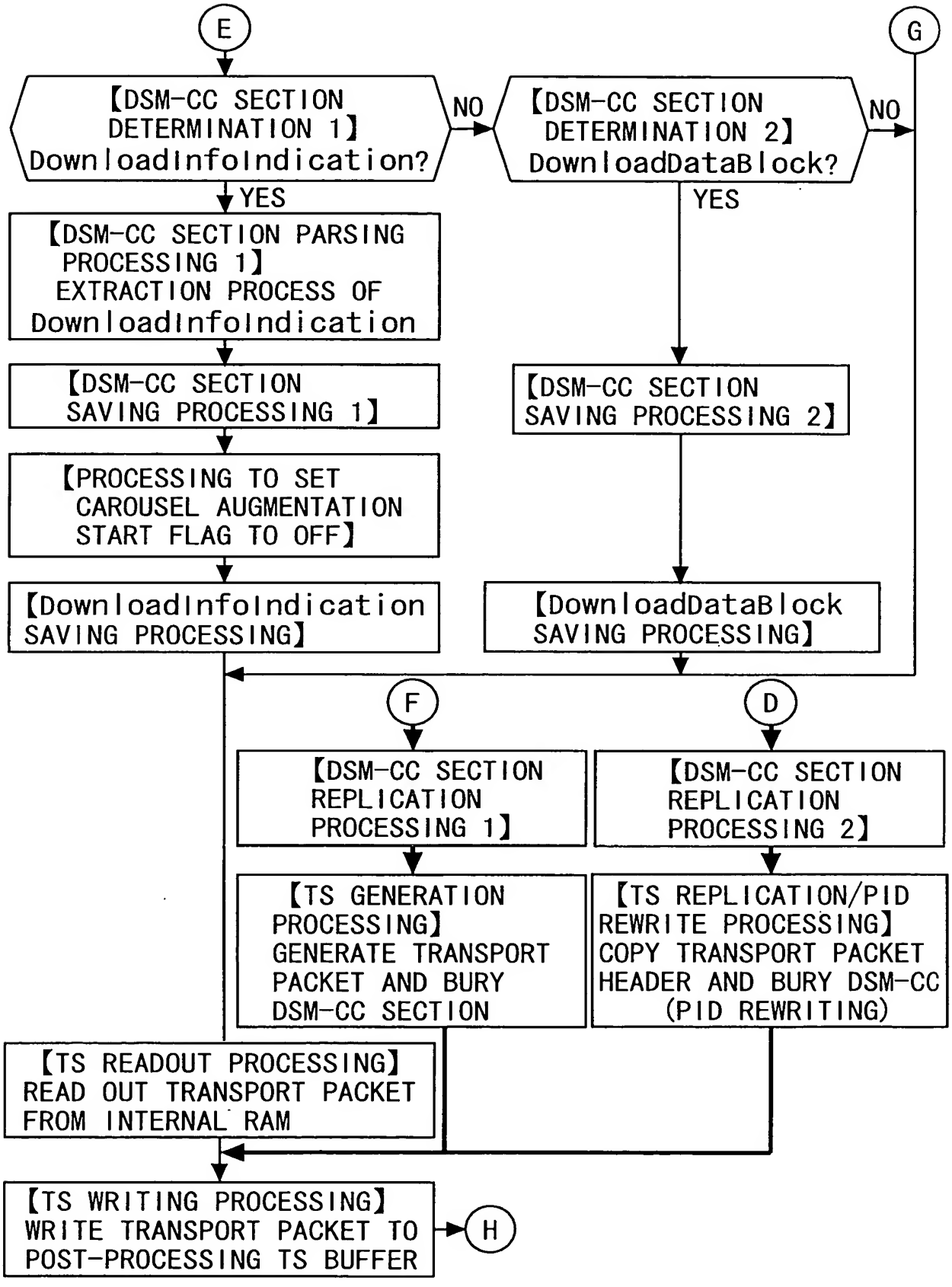

E
【DSM-CC SECTION DETERMINATION 1】 DownloadInfoIndication?
NO
【DSM-CC SECTION DETERMINATION 2】 DownloadDataBlock?
NO
G
YES
YES
【DSM-CC SECTION PARSING PROCESSING 1】 EXTRACTION PROCESS OF DownloadInfoIndication
【DSM-CC SECTION SAVING PROCESSING 1】
【DSM-CC SECTION SAVING PROCESSING 2】
【PROCESSING TO SET CAROUSEL AUGMENTATION START FLAG TO OFF】
【DownloadInfoIndication SAVING PROCESSING】
【DownloadDataBlock SAVING PROCESSING】
F
D
【DSM-CC SECTION REPLICATION PROCESSING 1】
【DSM-CC SECTION REPLICATION PROCESSING 2】
【TS GENERATION PROCESSING】 GENERATE TRANSPORT PACKET AND BURY DSM-CC SECTION
【TS REPLICATION/PID REWRITE PROCESSING】 COPY TRANSPORT PACKET HEADER AND BURY DSM-CC (PID REWRITING)
【TS READOUT PROCESSING】 READ OUT TRANSPORT PACKET FROM INTERNAL RAM
【TS WRITING PROCESSING】 WRITE TRANSPORT PACKET TO POST-PROCESSING TS BUFFER
H

FIG. 25

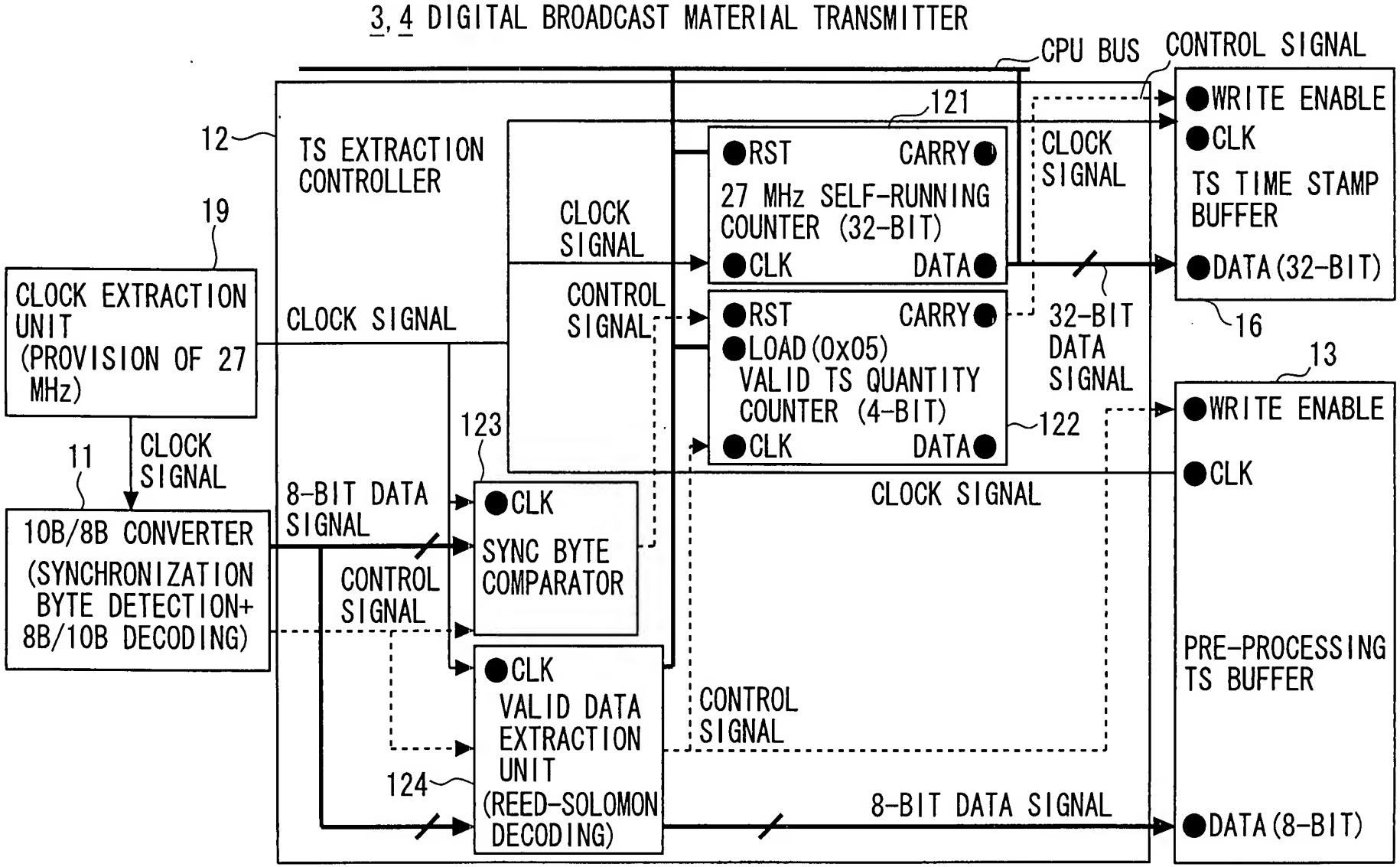
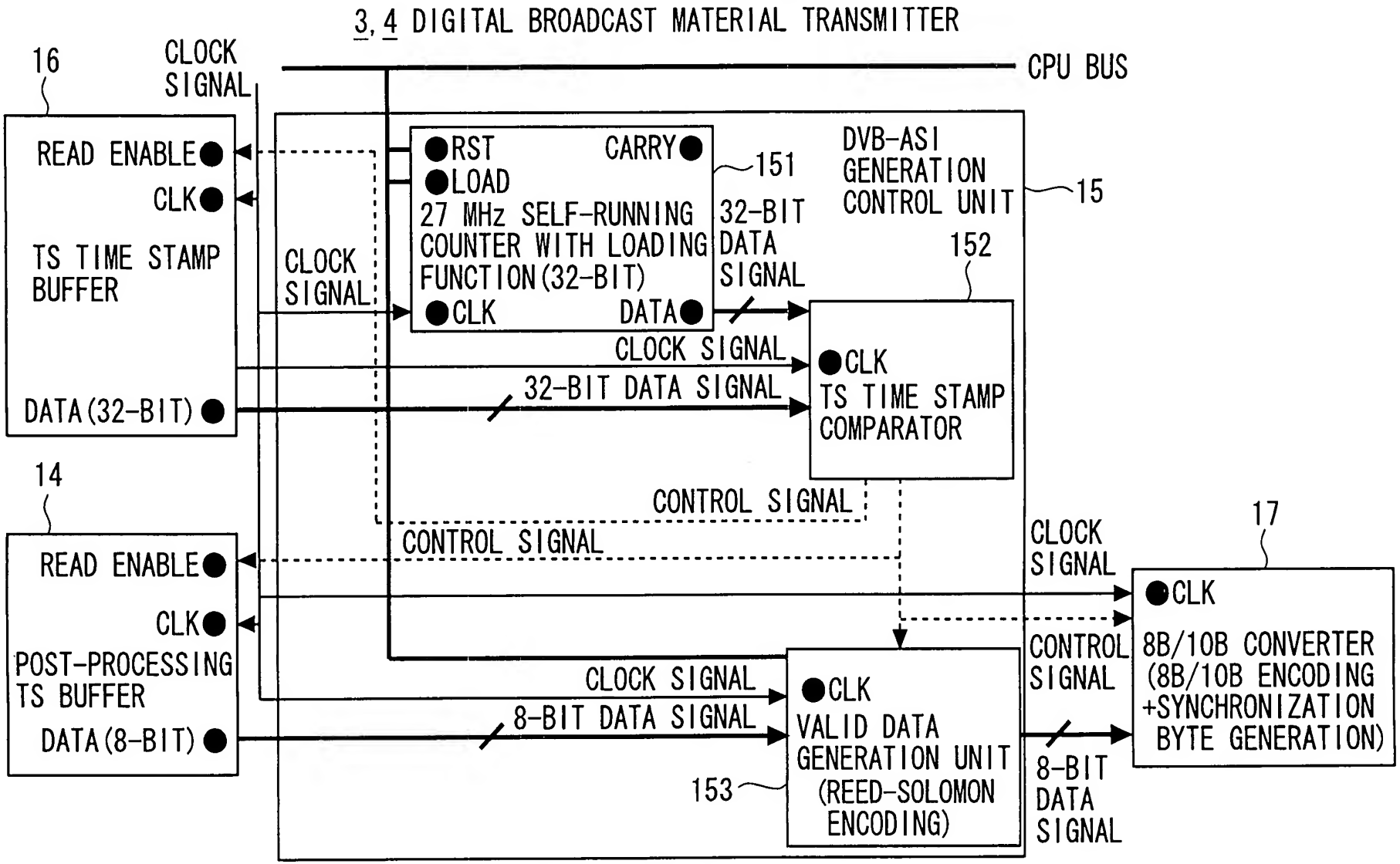

3, 4 DIGITAL BROADCAST MATERIAL TRANSMITTER
CPU BUS
CONTROL SIGNAL
12
TS EXTRACTION CONTROLLER
121
RST
CARRY
27 MHz SELF-RUNNING COUNTER (32-BIT)
CLK
DATA
CLOCK SIGNAL
WRITE ENABLE
CLK
TS TIME STAMP BUFFER
DATA (32-BIT)
16
19
CLOCK EXTRACTION UNIT (PROVISION OF 27 MHz)
CLOCK SIGNAL
CONTROL SIGNAL
RST
CARRY
LOAD (0x05)
VALID TS QUANTITY COUNTER (4-BIT)
CLK
DATA
122
32-BIT DATA SIGNAL
13
WRITE ENABLE
CLK
123
11
CLOCK SIGNAL
8-BIT DATA SIGNAL
CLK
SYNC BYTE COMPARATOR
CLOCK SIGNAL
10B/8B CONVERTER (SYNCHRONIZATION BYTE DETECTION+ 8B/10B DECODING)
CONTROL SIGNAL
CLK
VALID DATA EXTRACTION UNIT (REED-SOLOMON DECODING)
CONTROL SIGNAL
124
8-BIT DATA SIGNAL
PRE-PROCESSING TS BUFFER
DATA (8-BIT)

FIG. 26


3, 4 DIGITAL BROADCAST MATERIAL TRANSMITTER
16
CLOCK SIGNAL
CPU BUS
READ ENABLE
CLK
TS TIME STAMP BUFFER
DATA (32-BIT)
RST
CARRY
LOAD
27 MHz SELF-RUNNING COUNTER WITH LOADING FUNCTION (32-BIT)
CLK
DATA
151
32-BIT DATA SIGNAL
DVB-ASI GENERATION CONTROL UNIT
15
152
CLOCK SIGNAL
32-BIT DATA SIGNAL
CLK
TS TIME STAMP COMPARATOR
14
CONTROL SIGNAL
CONTROL SIGNAL
READ ENABLE
CLK
POST-PROCESSING TS BUFFER
DATA (8-BIT)
CLOCK SIGNAL
8-BIT DATA SIGNAL
CLK
VALID DATA GENERATION UNIT (REED-SOLOMON ENCODING)
153
CLOCK SIGNAL
CONTROL SIGNAL
8-BIT DATA SIGNAL
17
CLK
8B/10B CONVERTER (8B/10B ENCODING +SYNCHRONIZATION BYTE GENERATION)